REMARKS

Claims 1-21 are pending. Claims 1, 2, 10, and 20 are amended with this response. New claim 22 has been added. Claims 1, 2, and 20, are amended for further clarification. Applicant notes with appreciation the provisional allowance of claims 3-9 and 12-18. Reconsideration of the application is respectfully requested in light of the following discussion.

I. REJECTION OF CLAIM 10 UNDER 35 U.S.C. § 102(a)

Claim 10 was rejected under 35 U.S.C. § 102(a) as being anticipated by figure 6 of admitted Prior Art. Withdrawal of the rejection is respectfully requested for at least the following reasons.

The Office Action stated that the claim 10 rejection was still maintained because the pending claim did not include the claimed subject matter "gradually reducing" as argued in the previous response. Claim 10 has been amended in this response to comprise "gradually reducing."

As argued in the previous response, the device shown in figure 6 of the admitted Prior Art fails to anticipate the control system of claim 1 of the present invention. (*See*, figure 7 or figure 8, element 106). More particularly, the prior art fails to provide information on **how** the control would be implemented. For example, neither figure 6 nor background information of the specification disclose the ***gradual switch*** between the pilot-based and the data-based tracking as taught in claim 1 of the present invention. Withdrawal of the rejection is therefore respectfully requested.

II. REJECTION OF CLAIMS 1-2, 11, AND 19-21 UNDER 35 U.S.C. § 103(a)

Claims 1-2, 11, and 19-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2004/0170227 (Frank). Withdrawal of the rejection is respectfully requested for at least the following reasons.

i. Frank does not disclose a tracking system comprising a first system performing a pilot-based phase and frequency tracking and a second system performing data-based phase and frequency tracking, as recited in the claims 1, 2, and 20.

Claim 1 of the present invention relates to a tracking system comprising a first system performing a pilot-based phase and frequency tracking, a second system performing a data-based phase and frequency tracking, and a control system connected to said first system and to said second system gradually switching from the pilot-based phase and frequency tracking to the data-based phase and frequency tracking. Frank does not disclose a first system and a second system, as recited in the claims.

Frank discloses a frequency tracker that corrects frequency deviations of signals in a multicarrier system, ***but does not disclose a tracking system comprising a first system performing a pilot-based phase and frequency tracking and a second system performing data-based phase and frequency tracking, as recited in the claims.*** For example, Frank discloses an estimated phase offset is calculated ***for a data signal*** as a function of a previous data signal (*see, page 2, para. 0017).* The frequency tracker comprises a receiving means (2) for receiving a signal ($r_s[n]$) , a frequency correction means (6) for correction of the data signals in response to a corresponding predicted phase offset ($\varphi_A[k-1]$), and a phase locked loop means (*see,* Fig. 4). The phase locked loop means comprises a phase discrimination means (16) for generating an estimated phase offset for each data signal as a function thereof and a filter means (F(z)) for receiving the estimated phase offsets (*see, Frank,* Fig. 4; page 2, para. 0028). In addition, the preamble of the received signal is transferred to a channel estimation means (4) to provide values being indicative of the channel estimation of each subcarrier (*see,* page 3, para. 0045). The channel estimation is then provided to a multiplier (14) and to a subcarrier demodulation means (10). The output of the subcarrier demodulation means is remodulated by a mapping means (12) whose output is multiplied by the channel estimation means output at multiplier (14) (*see,* page

3, para. 0048). The phase discrimination, between received signal samples $R_m[k]$ and the output of the multiplier (14), yields the phase estimation (*see,* page 3, para. 0045-0050). Finally, after going through the filter means (F(z)) an estimated phase offset is calculated for a data signal as a function of a previous data signal (*see, page 2, para. 0017).* However, ***Frank does not disclose a first system performing a pilot-based phase and frequency tracking and a second system performing data-based phase and frequency tracking, as recited in claim 1.*** Rather, Franks discloses solely a data-based phase and frequency tracking solution.

The Office Action characterizes the frequency correction (6) and FFT (8) of Fig. 4 in Frank as corresponding to the first system of claim 1, and the channel estimation (4), subcarrier demodulation (10), mapping (12) and calculation of carrier phase offset per sample (24) as corresponding to the second system of claim 1. Applicants respectfully disagree because Frank only discloses one system for calculating an estimated phase offset for a data signal as a function of a preceding signal. This is not the same as a tracking system with a first system and a second system as recited in claim 1. In particular, the channel estimation (4), subcarrier demodulation (10), mapping (12) and calculation of carrier phase offset per sample (24) of Frank is not a system performing either a pilot-based phase and frequency tracking, nor performing data-based phase and frequency tracking. Rather, this portion of Frank's frequency tracker **is directed towards providing a distance** (in the time domain) between a corresponding phase reference point for the predicted phase offset and a phase reference point defined for a specific part of the received signal, preferably for a preceding preamble signal (*see,* Abstract; *see also,* page 3, para. 0045). For instance, the preamble of the received signal is transferred to a channel estimation means (4) to provide values being indicative of the channel estimation of each subcarrier (*see,* page 3, para. 0045). Therefore, the channel estimation (4), subcarrier demodulation (10), mapping (12) and calculation of carrier phase offset per sample (24) of Frank is only in support of calculating a predicted phase offset based on an estimated phase offset for a received signal, and subsequent received signals being sampled for each sample for a phase

offset to be corrected. No tracking system comprising a second system is present in Frank, as recited in claim 1 (where two tracking systems are present, one performing a data-based phase and frequency tracking and another performing a pilot-based phase and frequency tracking).

Further, Frank does not teach or disclose pilot-based frequency and phase tracking. One of ordinary skill in the art would recognize that pilot-based frequency and phase tracking is different from data-based frequency and phase tracking. Frank does not provide any teaching for employing pilot-based tracking and in particular does not provide any motivation for utilizing a combined system of both pilot-based tracking and data-based tracking, as recited in the claims. Withdrawal of the rejection is therefore respectfully requested.

ii. One of ordinary skill in the art would not have recognized that the multiplication (14) means, phase discrimination (16) means, and filter (F(z)) of Frank gradually reduces the effect of a first system that performs pilot-based phase and frequency tracking to a second system that performs data-based phase and frequency tracking, as recited in claims 1, 2, and 20.

The Office Action concedes that no control system is disclosed in Frank that gradually switches from the first system to the second system as recited in claim 1, but further states that because multiplication means (14), phase discrimination (16) and filter (F(z)) gradually updates frequency correction, one of ordinary skill in the art would have recognized that these three components gradually reduces the effect of the first system and the second system. Applicant respectfully disagrees in the light of the above discussion **that Frank does not teach a frequency tracker with a first system and a second system as claimed (nor does he teach a controller as conceded)**, and further in light of the following discussion.

No reduction of a first system or a second system in Frank is occurring by any controller. For example, the phase discrimination means (16) in Frank is not reducing the effect of one system over another, but instead with a phase locked loop

generates an estimated phase offset for each data signal as a function thereof and a filter means (F(z)) for receiving the estimated phase offsets (*see, Frank,* Fig. 4; page 2, para. 0028). The fact that correction is occurring by the discriminator (16) does not mean that the phase discriminator reduces an effect of a system for frequency and phase tracking. For example, on page 1, paragraph 0007, Franks explains that the accuracy of signals in a particular standard, for example, leads to high frequency offsets, and states the following:

> As a result, algorithms for a compensation of these frequency offsets have to be implemented. On the basis of OFDM, usually a frequency correction is done based on an estimation of phase offsets using the C-preamble. The frequency offsets still remaining result in a low performance and require further compensation to correct the remaining frequency offsets.

See, page 1, para. 0007. No reduction of one system over another system is occurring because 1) compensation continues to be implemented (as stated by Frank), 2) frequency offsets remaining continue to result in low performance, and 3) further compensation is needed to correct remaining offsets. Therefore, a reduction of one system over another is not occurring in Frank, especially by means of a controller, because compensation is continually needed.

Further, the first system characterized by the Office Action as the frequency correction (6) and FFT (8) of Fig. 4 in Frank, and the second system of claim one characterized as the channel estimation (4), subcarrier demodulation (10), mapping (12) and calculation of carrier phase offset per sample (24) is not an accurate characterization for reducing the first system over the second system by a controller, as recited in the claims. Despite the fact that Frank does not disclose a controller, Frank explicitly states that the first system is continually needed for frequency correction. In fact, if the frequency correction (6) and FFT (8) of Fig. 4 in Frank were reduced the system would be inoperable for the purpose of compensating frequency offsets, which Frank makes explicit in the above quote that algorithms for a compensation of frequency offsets **have to be implemented continuously as new signals in a multicarrier system are received**. Consequently, Frank does not disclose a tracking

system with a controller for gradually switching or reducing from a first system to a second system because 1) there is no switching or reducing occurring in Frank, 2) there is no second and first system in Frank, 3) as conceded, and there is no controller for switching or reducing from a first system to a second system. Further, nor would it be obvious to one of ordinary skill in the art that switching or reducing from a first system to a second system is already occurring in the teachings of Frank merely because frequency compensation is being performed. Withdrawal of the rejection is therefore respectfully requested.

iii. For reasons discussed above the claims 11, 19, and 21 to a method are also nonobvious over Frank.

Claim 11 relates to a method for tracking rapid changes in frequency and phase offset in a receiver comprising gradually reducing an effect of said pilot-based phase and frequency tracking.

Claim 19 relates to at least one computer program product directly loadable into the internal memory of at least one digital compute comprising software code for gradually reducing an effect of the pilot-based phase and frequency tracking.

Claim 21 is directed to a method of performing both pilot-based phase and frequency tracking and data-based phase and frequency tracking. The method further comprises gradually reducing an effect of said pilot-based phase and frequency tracking and increasing an effect of said data-based phase and frequency tracking system.

As stated above, Frank does not disclose gradually reducing an effect of pilot-based phase and frequency tracking because Frank does not teach pilot-based phase and frequency tracking, and further it is not obvious that the frequency tracker of Frank is reducing a first or a second system even if Frank did teach pilot-based frequency and phase tracking. Withdrawal of the rejection is therefore respectfully requested.

II. NEW CLAIM 22

New claim 22 has been added with this response and is novel over the cited art. Frank does not teach a tracking system comprising a first system and a second system as claimed wherein the first system comprises a first correction means and the second system comprises a second correction means. Therefore, an acceptance of dependent claim 22 is respectfully requested.

III. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, LLP127US.

Respectfully submitted,
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